

A Space Data System Interface for Self-Identifying Devices

by

Wm. Randy Heuser
Member of the Technical Staff
Jet Propulsion Laboratory
California Institute of Technology
Mail Stop 301-235
4800 Oak Grove Drive
Pasadena, California 91109
Office phone (81 8) 354-0956, Fax (818) 354-9068
email: rheuser@binky.jpl.nasa.gov

Abstract

Improved technologies and declining budgets for space exploration have space agencies around the world to examine new approaches to building and flying spacecraft. A key element in most proposals to reduce the costs of space exploration is increased automation. Most programs are looking to expand automation in the ground systems and many are planning to employ expanded computing facilities to increase automation onboard. However, all of these plans rely on software to achieve automation and the cost of software development has increased significantly over the past ten years. If the cost of space exploration is really going to be reduced through automation, the cost of developing software-based systems for space missions must be significantly reduced.

This paper describes development efforts aimed at a standard message specification for space system devices. This message specification provides for self-identifying devices for onboard and ground systems that can be installed and configured without the traditional software development effort. Models and prototypes of self-identifying, self-configuring spacecraft devices are described. Services to identify and manage the operational envelop of a device are also examined. The application of these services to coordinate the inter-operation of devices and overall operation of the system are also examined in detail. The basis for this approach is derived from technologies developed for process control in the electric utility, manufacturing, petrochemical and pharmaceutical industries. The cost of automation in these industries has lead to the development of robotic devices, instrumentation and software products that can be integrated into a working system with little or no software development. Standard interface specifications are a crucial element in assembling these systems. Similar cost savings to those achieved in the process control industry, are expected through the application of interface standards in the space industry.